

Binomial Theorem — Assignment 1

Class 11 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Binomial Expansion for Positive Integral Index

MCQ Questions (choose the correct option)

- The binomial expansion of $(a + b)^n$ has
 - $n + 1$ terms
 - n terms
 - $2n$ terms
 - n^2 terms
- In the expansion of $(x + 2)^5$, the number of terms is
 - 6
 - 5
 - 10
 - 25
- The first term of the expansion of $(a + b)^n$ is
 - a^n
 - b^n
 - na
 - ab
- The coefficient of x^3 in $(1 + x)^4$ is
 - 4
 - 6
 - 3
 - 1

1 Mark Questions

- Write the binomial expansion of $(a + b)^n$.
- How many terms are there in the expansion of $(1 + x)^6$?
- Find the first term of the expansion of $(a + b)^n$.

2 Mark Questions

- Expand $(1 + x)^4$ using the binomial theorem.
- Expand $(2x + 1)^3$ using the binomial theorem.

3 Mark Questions

- Expand $(x^2 + 3/x)^4$ using the binomial theorem and simplify.
- Using the binomial theorem, expand $(2 + 3x)^4$ and find the coefficient of x^2 .

Pascal's Triangle

MCQ Questions (choose the correct option)

- The numbers in the n -th row of Pascal's triangle are
 - the binomial coefficients nCr
 - primes
 - factorials
 - Fibonacci numbers
- Each number in Pascal's triangle is the sum of
 - the two numbers above it
 - the number to its left only
 - the number to its right only
 - all numbers in the row
- The third row of Pascal's triangle ($n = 2$) is
 - 1, 2, 1
 - 1, 1
 - 1, 3, 3, 1
 - 1, 4, 6, 4, 1
- The binomial coefficients for $n = 3$ are
 - 1, 3, 3, 1
 - 1, 2, 1
 - 1, 4, 6, 4, 1
 - 1, 3, 1

1 Mark Questions

- Write the first four rows of Pascal's triangle.
- What are the binomial coefficients for $n = 4$?
- State the rule for building Pascal's triangle.

2 Mark Questions

- Write the expansion of $(a + b)^4$ using Pascal's triangle.
- Explain how Pascal's triangle gives the binomial coefficients.

3 Mark Questions

- Construct Pascal's triangle up to $n = 5$ and use it to expand $(x + y)^5$.
- Using Pascal's triangle, expand $(1 + x)^5$ and write all the coefficients.

General Term

MCQ Questions (choose the correct option)

- The general term $(r + 1)$ -th term in the expansion of $(a + b)^n$ is
 - $nCr a^{n-r} b^r$
 - $nCr a^r b^{n-r}$
 - $nPr a^{n-r} b^r$
 - $a^n b^r$
- In the expansion of $(x + y)^n$, the $(r+1)$ -th term from the beginning is

- (A) $nCr x^{n-r} y^r$
 (B) $nCr x^r y^{n-r}$
 (C) $x^n y^r$
 (D) $nr x y$
3. The coefficient of x^5 in $(1 + x)^{10}$ is
 (A) $10C5$
 (B) $10C4$
 (C) $5!$
 (D) $10P5$
4. In the expansion of $(1 + x)^8$, the term containing x^3 has coefficient
 (A) $8C3$
 (B) $8C5$
 (C) $8P3$
 (D) $3!$

1 Mark Questions

- Write the general term of the expansion of $(a + b)^n$.
- Find the coefficient of x^5 in $(1 + x)^{10}$.
- Write the $(r+1)$ -th term from the beginning in $(x + y)^n$.

2 Mark Questions

- Find the coefficient of x^3 in the expansion of $(1 + x)^8$.
- Find the 5th term in the expansion of $(x + 2)^6$.

3 Mark Questions

- Find the coefficient of x^6 in the expansion of $(2x^2 + 1/x)^9$.
- Find the term independent of x in the expansion of $(x - 2/x^2)^9$.

Middle Term

MCQ Questions (choose the correct option)

- If n is even, the expansion of $(a + b)^n$ has
 (A) one middle term
 (B) two middle terms
 (C) no middle term
 (D) n middle terms
- If n is odd, the expansion of $(a + b)^n$ has
 (A) two middle terms
 (B) one middle term
 (C) no middle term
 (D) n middle terms
- The middle term in the expansion of $(a + b)^6$ is the
 (A) 4th term
 (B) 3rd term
 (C) 5th term

(D) 6th term

4. The number of middle terms in $(a + b)^7$ is

(A) 2

(B) 1

(C) 0

(D) 3

1 Mark Questions

1. How many middle terms are there when n is even?

2. How many middle terms are there when n is odd?

3. Which term is the middle term in the expansion of $(a + b)^6$?

2 Mark Questions

1. Find the middle term in the expansion of $(x + 1/x)^6$.

2. Find the two middle terms in the expansion of $(a + b)^7$.

3 Mark Questions

1. Find the middle term in the expansion of $(2x + 1/x^2)^8$.

2. Find the two middle terms in the expansion of $(x - 1/x)^9$.

Properties of Binomial Coefficients

MCQ Questions (choose the correct option)

1. The sum of all binomial coefficients $C(n,0) + C(n,1) + \dots + C(n,n)$ is

(A) 2^n

(B) n^2

(C) $2n$

(D) $n!$

2. The value of $C(n,0) + C(n,1) + \dots + C(n,n)$ for $n = 4$ is

(A) 16

(B) 8

(C) 10

(D) 4

3. The coefficients equidistant from the ends in $(a + b)^n$ are

(A) equal

(B) always different

(C) increasing

(D) zero

4. $C(n,0) - C(n,1) + C(n,2) - \dots$ equals

(A) 0

(B) 1

(C) 2^n

(D) n

1 Mark Questions

1. Find the sum of all binomial coefficients in the expansion of $(1 + x)^n$.
2. Evaluate $C(4,0) + C(4,1) + \dots + C(4,4)$.
3. State one property of Pascal's-triangle coefficients.

2 Mark Questions

1. Prove that $C(n,0) + C(n,1) + \dots + C(n,n) = 2^n$.
2. Find the sum of the even-position and odd-position coefficients in $(1 + x)^n$.

3 Mark Questions

1. Prove that $C(n,0) + C(n,1) + C(n,2) + \dots + C(n,n) = 2^n$ and $C(n,1) + C(n,3) + \dots = 2^{n-1}$.
2. Prove that the sum of the coefficients in the expansion of $(1 + x)^n$ is 2^n and apply it to find the sum for $n = 6$.

Applications and Simplifications

MCQ Questions (choose the correct option)

1. The value of $(1.01)^5$ can be approximated using
 - (A) the binomial expansion
 - (B) logarithms only
 - (C) Pascal's triangle only
 - (D) factorials
2. The binomial theorem can be applied to find
 - (A) the approximate value of numbers close to 1
 - (B) only exact integers
 - (C) square roots only
 - (D) trigonometric ratios
3. In simplifying $(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5$, the odd-power terms
 - (A) cancel out
 - (B) double
 - (C) become zero
 - (D) remain unchanged
4. The value of 99^3 can be found using the expansion of
 - (A) $(100 - 1)^3$
 - (B) $(100 + 1)^3$
 - (C) 99×3
 - (D) $(99)^2$

1 Mark Questions

1. Why can the binomial theorem approximate $(1.01)^5$?
2. Compute 99^3 using a binomial expansion.
3. In $(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5$, which terms cancel?

2 Mark Questions

1. Using the binomial theorem, evaluate $(1.01)^5$ to three decimal places.
2. Find the value of $(2 + \sqrt{3})^4 - (2 - \sqrt{3})^4$.

3 Mark Questions

1. Using the binomial theorem, find the value of $(1.02)^6$ correct to three decimal places.
2. Prove that $(\sqrt{2} + 1)^5 - (\sqrt{2} - 1)^5 = 82\sqrt{2}$ using the binomial expansion.